

CLAIMS

What is claimed is:

1. A method for constructing a medical implant device, comprising:

forming a porous metal base;

depositing a corrosion barrier layer on said porous metal base, said
deposition including laser based metal deposition (LBMD); and

depositing a layer comprising a bearing material onto said corrosion
barrier layer using LBMD.
2. A method as in claim 1, wherein said porous metal base comprises a material selected
from the group consisting of: cobalt-chrome, tantalum (Ta), titanium, stainless
steel, and alloys thereof.
3. A method as in claim 1, wherein said corrosion barrier layer comprises titanium (Ti).
4. A method as in claim 1, wherein said corrosion barrier layer comprise an alloy
including Ti.
5. A method as in claim 1, wherein said laser based metal deposition of said barrier
layer includes applying said barrier layer as a foil and heating said foil with a
laser.
6. A method as in claim 1, wherein said laser based metal deposition of said barrier
layer includes applying said barrier layer as a powder and heating said powder
with a laser.

7. A method as in claim 1, wherein said laser based metal deposition of said barrier layer includes applying said barrier layer as a wire.
8. A method as in claim 1 wherein said bearing material layer comprises of a Co-Cr layer comprising an alloy comprised of cobalt (Co) and chromium (Cr).
9. A method as in claim 8, wherein said alloy comprised of cobalt (Co) and chromium (Cr) is formed as a foil and heating said foil with a laser.
10. A method as in claim 8, wherein said alloy comprised of cobalt (Co) and chromium (Cr) is formed as a powder and heating said wire with a laser.
11. A method as in claim 8, wherein said alloy comprised of cobalt (Co) and chromium (Cr) is formed as a wire and heating said wire with a laser.
12. A method as in claim 8, wherein said laser based metal deposition of said corrosion barrier layer and said Co-Cr layer includes heating said corrosion barrier layer and said Co-Cr layer with a high power Nd YAG laser.
13. A method as in claim 8, wherein said (LBMD) heats said Co-Cr sufficiently to melt said Co-Cr and also allows said Co-Cr to cool sufficiently quickly to form a small grain structure in said Co-Cr thereby hardening said Co-Cr.
14. A method as in claim 8, wherein said (LBMD) heats said Co-Cr sufficiently to melt said Co-Cr and also allows said Co-Cr to cool sufficiently quickly to form carbon interspersions in said Co-Cr, thereby hardening said Co-Cr.
15. A method as in claim 1, wherein said base comprises Ti-6Al-4V.
16. A method as in claim 1, wherein said base comprises Ti or any alloy thereof.

17. A method as in claim 1, wherein at least one of said corrosion barrier layer and said bearing material is deposited in a plurality of layers having differing material properties to form a gradient of material properties.

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18. A method for constructing a medical implant device, comprising:

forming a first structure including a porous base;

depositing a corrosion barrier layer on said porous metal base, said deposition

including laser based metal deposition;

depositing a layer comprising Co and Cr (Co-Cr) onto said corrosion barrier layer

using laser based metal deposition;

providing a second structure comprising Co-Cr; and bonding said deposited Co-

Cr portion of said first structure onto said second structure.

19. A method as in claim 18, wherein said porous base comprises Ti or alloy thereof.

20. A method as in claim 18, wherein said porous base comprises Co-Cr or any alloy thereof.

21. A method as in claim 18, wherein said porous base comprises tantalum or any alloy thereof.

22. A medical implant device, comprising:

a porous metal base;

corrosion barrier layer formed on said porous metal base by laser based

metal deposition (LBMD); and

a second layer formed on said corrosion barrier layer using LBMD, the second

layer having a hardness greater than the porous metal base.

23. A device as in claim 22, wherein said porous metal base comprises a material selected

from the group consisting of: Ta, Ti, stainless steel, and alloys thereof.

24. A device as in claim 22, wherein said corrosion barrier layer comprises Ti or alloys

thereof.

25. A device as in claim 22, wherein said second layer comprises Co and Cr.

26. A device as in claim 22, wherein said porous metal base comprises Ta, said corrosion

barrier layer comprises Ti or alloys thereof, and said second layer comprises

Co and Cr.

27. A device as in claim 22, wherein said second layer is coupled to a second medical

implant device.

28. A method for constructing a medical implant device, comprising:

forming a structure from a base metal;

depositing a second layer onto the surface of the base metal comprising a Co-Cr alloy bearing material using Laser Based Metal Deposition (LBMD).

29. A method as in claim 28, wherein said (LBMD) heats said Co-Cr bearing material

sufficiently to melt said Co-Cr bearing material and also allows said Co-Cr bearing material to cool sufficiently quickly to form a small grain structure in said Co-Cr bearing material thereby hardening said Co-Cr bearing material.

30. A method as in claim 28, wherein said (LBMD) heats said Co-Cr sufficiently to melt

said Co-Cr bearing material and also allows said Co-Cr bearing material to cool sufficiently quickly to form carbon interspersions in said Co-Cr bearing material, thereby hardening said Co-Cr bearing material.

31. A medical implant device, comprising:

a metal base structure;

second layer formed onto said metal base structure by Laser Based Metal Deposition (LBMD); the second layer comprising a Cobalt-Chrome based alloy having a hardness greater than the metal base structure.

32. A device as in claim 31, wherein said metal base structure comprises a material selected from the group consisting of: Cobalt-Chrome, Tantalum, Titanium, Platinum, stainless steel, and alloys thereof.

33. A device as in claim 31, wherein said second layer is coupled to a second medical implant device.

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